CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUD

In milling operation, self excited vibrations also called the chatter are one of the main factors that limit productivity. The project is used sensor chatter and non-sensor chatter to measure the variance of the signal sampled at a once per revolution rate. The sensor chatter is one of the main factors that lower the productivity. Higher efforts tend to accelerate tool wear and can lead to tool breakage. One primary limiting factor in achieving high material removal rate (MRR) in milling operation is unstable cutting or chatter, characterized by increased forces and varying levels of work pieces and/or tool damage.

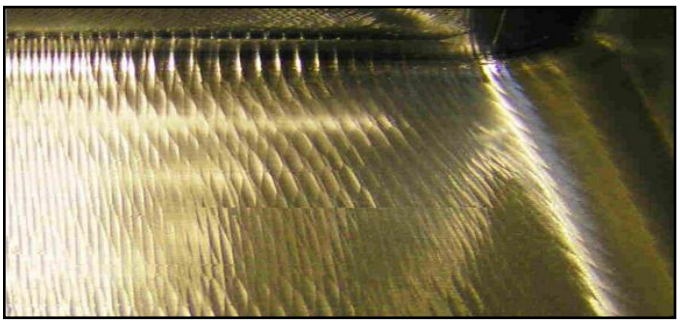

Figure 1.1: Poor surface finish of the product caused by the chatter of machining

Source: http://www.google.com.my/imgres

This project used the accelerometer to measures vibration and proper acceleration, also called the four-acceleration. The mounting of an accelerometer is easy but it is location must be carefully chosen. Indeed, if the sensor is close to a vibration node, signal amplitude would be very low. During the milling process, nodes can move, so it is very difficult to predict an optimal location. It is very difficult to put accelerometer on a rotating part. Beside that, the sensor tachometer (RPM gauge) is an instrument measuring the rotation speed of a tool milling machine. The device usually displays the revolutions per minute (RPM) on a calibrated analogue dial, but for this project the software of DasyLab that used can convert to revolution per second (RPS).

Specially, a chatter identification system to be applied in industrial conditions should have the following characteristics; (Kuljanic and Sortino, 2009)

1) It should not reduce stiffness and damping of the machine tool

2) It should be compatible to pallet changer and tool changer

3) It should not limit cutting parameters, tool dimension, work pieces dimensions and tool geometry.

4) The functioning of the chatter detection systems should not rely on the knowledge of the actual cutting conditions and on prior knowledge of the machining systems dynamics.

5) The system should be insensitive to environmental noise and it should be robust against the malfunctioning of one of its components.

1.2 PROBLEM STATEMENT

Study of the chatter and non-chatter vibration occurrences due to interaction of end mill cutter tool and workpiece. This project also to study about higher percentage of chatter vibration in end milling process as a function to increase metal removal rate.

1.3 OBJECTIVE OF PROJECT

1) To integrate tachometer with accelerometer for measure sensor chatter.
2) To analyze operation chatter at condition once per revolution and vibration in machining

1.4 SCOPE OF PROJECT

Scope of this project is to operation chatter at condition once per revolution and vibration in machining. For the next step, experiment will go through testing used the DasyLab. The project was used accelerometers to measures vibration and sensor tachometer (RPM gauge) is an instrument measuring the rotation speed of a tool milling machine. For many material that are easy to machine, this research activity has helped to motivate the development of operation machining, where very high material rate can be combined with good chatter stability and high quality surface finish. For this project, we used aluminum 7075 as a material.

This systems was programmed by DasyLab and used a National Instrument High Speed USB Carrier NI USB-9162 to measure the once per revolution. The signal from accelerometers and tachometer will be send to laptop. This signal for once per revolution will get and see from the laptop. Taken and analysis the data. The sequence of work has been planned as shown in Figure 1.2 in order to achieve the objectives of this research, while Gantt Charts can refer to Appendix A. This flow chart is useful as guideline to ensure that the experiment is carried out smoothly.